

Observations of mangrove habitation by the monitor lizard *Varanus panoptes*

Sean J. Blamires and Madeleine Nobbs

School of Biological & Environmental Sciences
Northern Territory University, Darwin, NT, 0909

Several species of monitor lizard (*Varanus* spp.) may be found in mangrove ecosystems. Mangrove specialists include *Varanus salvator* in Indo-Malaysia and India (Sasekumar 1970, Pandav & Choundhury 1996); *V. indicus* in Guam, Indonesia and the Solomon Islands (Wickramanayake & Dryden 1988, Harvey & Barker 1998, Sprackland 1994); and *V. semiremex* in north Queensland (Cogger 1992). Some monitors, such as *V. bengalensis* (Auffenberg 1994, Traeholt 1997), may exploit mangroves on a limited basis. However, while the Northern Territory coastline is predominantly lined with mangroves (Stodart 1977), only *V. indicus* has been recorded to occupy them (Cogger 1992).

Varanus panoptes is found throughout tropical northern Australia (Cogger 1992). It is largely terrestrial but may occupy riparian and coastal habitats (Shine 1986, Blamires & Guinea 1998) and is a capable swimmer (Martin 1990). Despite an association with tropical coasts and waterways this species has not previously been documented as utilising mangrove habitats. Here, we describe observations of *V. panoptes* from mangroves at Ludmilla Creek (12°25'S 130°51'E) in Darwin Harbour; and Fog Bay (12°43'S 130°20'E) approximately 150 km south-west of Darwin. These observations were made during weekly or fortnightly visits by MN to Ludmilla Ck between April 1996 and September 1998, and by SJB to Fog Bay between March 1997 and December 1998.

Ludmilla Creek

Ludmilla Ck is a localised mangrove system surrounded by urban development (described by Nobbs & McGuinness 1999). The first sighting of *V. panoptes* was in August 1996 at approximately 1300 hours. The monitor was 1-1.2 m long and was observed on the creek bank within the mangroves. It was distinguished from *V. indicus* by a dark green to brown back, yellow to white throat and belly and distinguishable tail stripes (Cogger 1992). The monitor fled into the mangrove forest not long after being seen. The second sighting was in May 1998 at approximately 1400 hours near the edge of the mangroves. This monitor (0.6-0.8 m long) was observed lying in shallow water within a man-made drainage channel which empties into Ludmilla Creek. The monitor did not move when approached and it was not until the animal was about to be handled that it fled. The lizard swam, with its limbs by its side, to the creek-

bank upstream and then fled into the forest lining the creek.

A dead *V. panoptes* (total length 1.09 m, snout to vent length 0.44 m) was also recovered from Ludmilla Creek in April 1998. The specimen had wounds suggesting it may have been attacked by a dog or dingo; a dingo was seen in the mangroves three days prior to the specimen being found. Dissection revealed that this monitor was a gravid female with seven shelled eggs within its oviducts (Blamires 1999a) and two cockroaches in its stomach.

Fog Bay

Observations at Fog Bay were made on the mainland, in mangroves behind beaches near Patterson Point. These beaches are described in detail by Blamires & Guinea (1998). In February 1998 at approximately 1330 hours, a 1-1.2 m long *V. panoptes* was observed from a vehicle on salt flats surrounded by mangroves. The monitor ran into nearby mangroves upon the vehicle stopping. The second sighting was in May 1998 at approximately 1200 hours when a small (0.6-0.8 m long) *V. panoptes* was observed lying in mud in mangroves approximately 1 km behind the sand dunes. This monitor slid off through the mud but, as in the second observation at Ludmilla Ck, was slow to respond on being approached.

Discussion

Given the low frequency of sightings it appears that *V. panoptes* is only an irregular inhabitant of mangroves at the study areas, despite being common in surrounding habitats. The specimen collected from Ludmilla Ck had apparently not been foraging in the mangroves and studies into the diet of *V. panoptes* at Fog Bay suggest that only the beachfront and dunes are utilised for foraging, for turtle eggs, insects, small mammals, reptiles and crustaceans (Blamires 1999b). This contrasts with mangrove specialists such as *V. indicus* and *V. salvator* that feed on a variety of crabs and fish from mangrove habitats (Dryden 1965, Pandav & Choudhury 1996). The fact that our sightings occurred between 1200 and 1400 hours suggests that *V. panoptes* retreats to the mangroves to escape the hottest time of day. This species has also been observed (by SJB) sitting in the intertidal zone and in the water at the surf break at this time of day. Lying in mud/water within the mangroves probably has a thermoregulatory function, similar to the behaviour observed in *V. salvator* (Wickramanayake & Green 1989; Tracholt 1995). Individuals in this position appeared to flee less readily than generally observed, which may be because the lizards were under heat stress. As well as offering a cool microclimate, mangroves may also serve as a refuge from predators. At Fog Bay, *Varanus panoptes* have often been observed (by SJB) fleeing into the mangroves from the dune crest when started.

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